Intellectual Property Protection for

Software-Related Inventions


 "The inventor ranks 'highest in the scale of useful beings,' followed by the farmer and mechanic."[1] – attributed to Newengland [sic] Association of Inventors and Patrons of Useful Arts, 1807.


I.  Introduction

In the United States, the laws that protect  intellectual property (fruit of the mind) exist to encourage private endeavors and investment in the development, production and public dissemination (in the cases of patents and copyrights) of various forms of new technology and information.  This objective is achieved by allowing individuals and businesses to acquire property rights in the technology and information they produce, sometimes for limited time duration, which enables them to engage in monopolistic or other commercial exploitation of the value of the technology and information.  The intellectual property laws seek to establish a balance between these private incentives for gain and the public access to the new technology and information for the general improvement of life.

The intellectual property laws in the United States stem from a Constitutional mandate to Congress, namely Article 1, section 8, clauses 3 and 8:

(3) To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes---.

(8)  To promote the Progress of Science and useful Arts[2], by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries---.

There are four categories of intellectual property, namely; trade secret, trademark, copyright and patent.  Each is briefly commented upon below.  However, it is the intention of the author to concentrate on patents, more specifically the patentability of computer software-related inventions which are becoming more and more numerous as well as more relevant to modern life and business.

(A)     Trade Secret:

i)     Definition: any formula, device, method  or collection of information which is used in one's business and which gives him a commercial advantage over competitors who do not know it or use it.

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[1] "Patents and Manufacturing in the Early Republic," by Edward C. Walterscheid, Journal of the Patent and Trademark Office Society, Vol. 80, No. 12 (December 1998), page 887.

[2]  According to Professor Paul Goldstein in Copyright, Patent, Trademark and Related State Doctrines, Cases and Materials on the Law of Intellectual Property-Revised Third Edition, (The Foundation Press, Inc., 1993) at page 20, study of the colonial usage and syntax indicates that in speaking of  "Science" and "useful Arts" in clause 8, the framers of the Constitution meant the works of authors and inventors, respectively.

ii)                    Must be kept secret to maintain validity.

iii)                 Is protected by pertinent state law and contract law.

iv)                  Computer software, like any other item, may be protected by trade secret if it is kept as a qualified secret and affords commercial advantage to the owner.

(A)        Trademark:

i)                     Definition: A distinctive mark of authenticity through the use of which particular manufacturers' or particular merchants' goods or services may be distinguished from those of others. Such a mark can be words, pictures, colors, shapes or any other mark but cannot be any sign or form of words that, because of their primary meaning, others may use with equal truth and right for the same purpose. (i.e. One cannot trademark words that describe the product).

ii)                    Protects consumers against confusion as to the sources of the goods and services. In cases of goods, such confusion may arise due to the fact that sellers or manufacturers typically have more and better information than the consumer-buyer does as to the internal aspects of an item for sale. Observable exterior features of an item can be imitated to the minutest degree by a competitor even though his imitation product may be vastly different in quality. Without trademark, the consumer's selection of the product with the desired qualities between products of identical or near-identical appearance is left to random chance.

iii)                 Is acquired through use in connection with a business.

iv)                  Protects the goodwill and reputation of a company from being eroded by a competitor.

v)                    Protected by 15 U. S. C. section 1051 et seq. (Lanham Trade-Mark Act, section 1 et seq.).

vi)                  May be used to protect against the copying of inherently distinctive and non-functional aspects of graphical user interface elements of a computer software if those non-functional aspects have developed secondary meanings in the market place (i.e. The non-functional aspects enable an ordinary user of the computer software immediately to associate the software with its source).

(A)        Copyright:

i)             Definition: The exclusive right to reproduce, distribute copies of, prepare derivative works of and publicly display or perform an original work of authorship.[3]

ii)            Copyright subsists in original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced or otherwise communicated, either directly or with the aid of a machine or device.[4]

iii)          Copyright law protects not idea itself but the form of expression of the idea.

iv)          Generally, copyright in a work subsists from its creation and endures for a term consisting of the life of the author and seventy (70) years after the author's death.

v)           Protected by 17 U. S. C.

vi)         Notable Exceptions to exclusive right:

     a)           Under 17 U. S. C. section 105, no copyright can subsist in any work prepared by an officer or employee of the United States Government as part of that person's official duties. However, the U. S. Government is not precluded from receiving and holding copyrights transferred to it by assignment, bequest or otherwise.

     b)           Fair use doctrine under 17 U. S. C. section 107 allows use of copyrighted work by reproduction for purposes such as criticism, comment, news reporting, teaching, scholarship or research without the reproduction being considered infringement of the copyright.

i)             Copyright notices do not need to appear on publicly-distributed copies to afford copyright protection.[5] Affixing the copyright notice on works is optional rather than mandatory.

ii)            17 U. S. C. section 101 defines a "computer program" as a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result.

iii)          Computer software programs, in general, are considered to be works of authorship subject to copyright protection. Copyright protects literal aspects of computer

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[3] 17 U. S. C. section 106
[4] 17 U. S. C. section 102(a)
[5] The Berne Convention Implementation Act of 1988, P. L. 100-568, 102 Stat. 2853 (Oct. 31, 1988) implementing the United States' adherence to the Berne Convention for the Protection of Literary and Artistic Works, effective March 1, 1989.

programs but may extend beyond the programs' literal codes (both source and object) to their structure, sequence, organization and user interface when they constitute expression, rather than mere ideas or concepts. However, copyright does not offer protection for the functional aspects of software, such as the underlying algorithms and protocols of multimedia technology (ex. computer icons – but new ornamental computer icons may be protected by design patents). Further, copyright protection is not available against independently-developed software products.

(D)     Patent:

    i)        Definition: Letters Patent granting the patent owner the right, for a limited period, to exclude others from making, using or selling the invented product or process.

    ii)        35 U. S. C. is the patent law passed by Congress in accordance with their Constitutional mandate and authority.[6]

    iii)        Purposes of affording patent protection:

        a)        Provides an incentive to develop and market new technology by offering the possibility of reward to the inventor, thus encouraging the expenditure of time and private capital in research and development efforts.

        b)        Encourages public disclosure of new technology which may otherwise be kept secret to maintain commercial advantage. Early disclosure brings early benefits to the public from the use of the new technology and reduces the possibility of wasteful duplication of efforts by others.

    i)        Subject to the payment of maintenance fees, a patent is valid for a period of 20 years from the effective filing date of the application that matured into the patent.[7] (The filing date of any properly-filed provisional application is basis for claiming domestic priority but the 20-year period of the issued patent is not calculated from the filing date of the provisional application.)

    ii)        There are three types of patents: Utility, Design and Plant.

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[6] U. S. Constitution, Article 1, section 8, clause 8.
[7] 35 U. S. C. section 154 (a) (2)

iii)     A utility patent must meet the requirements of novelty, usefulness and non-obviousness.

iv)     Subject to evolving requirements, a computer software-related invention may present a patentable subject matter under 35 U. S. C. section 101.

II. Patentability of Computer Software

(A)     Statutory Subject Matter under 35 U. S. C. section 101:

Before the determination can be made as to whether a software-related invention meets the requirements of novelty and non-obviousness set forth in 35 U. S. C. sections 102 and 103, respectively, as well as the requirements of full and enabling disclosure of 35 U. S. C. section 112, first a determination must be made whether the invention is statutory subject matter at all under 35 U. S. C. section 101.

35 U. S. C. section 101 provides as follows:

**Whoever invents or discovers any new and <u>useful</u> process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.** (emphasis supplied)

Even though the United States Supreme Court has made a sweeping declaration that inventive subject matter includes "anything under the sun that is made by man,"[8] the scope of what is patentable is limited by the text of 35 U. S. C. section 101. Restrictions on what may come within the patentable subject matter of inventions, including software-related inventions, as meant by 35 U. S. C. section 101 have been interpreted by the United States Patent and Trademark Office and the courts over the years. After much melee at the judicial front as well as at the PTO, it can safely be said that there are three remaining judicially-created categories of invention claims that are considered to be non-patentable, i.e. non-statutory subject matter: abstract ideas, laws of nature and natural phenomena.[9] "Mathematical algorithms" and "methods of doing business," two other judicially-created exclusions, used to be considered non-statutory subject matter. But decisions have been rendered that, for all practical purposes, did away with any rationale for these exclusions.[10, 11]

A significant hurdle to overcome in the dash to the goal of patentable subject matter determination is the requirement that the subject matter sought to be patented be a "useful" process, machine, manufacture or composition of matter. Accordingly, a complete definition, one that reflects the Congressional intent, of statutory subject matter is that any new and useful process, machine, manufacture or composition of

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[8] *Diamond v. Chakrabarty*, 447 U. S. 303, 206 USPQ193 (1980) quoting S. Rep. No. 1979, 82d Cong., 2d Sess., 5 (1952)

[9] *Diamond v. Diehr*, 450 U. S. 175, 209 USPQ 1 (1981)

[10] *In re Freeman*, 573 F.2d 1237, 197 USPQ 464 (C.C.P.A. 1978); *In re Walter*, 618 F.2d 758, 205 USPQ 397 (C.C.P.A. 1980); *In re Abele*, 684 F.2d 902, 214 USPQ 682 (C.C.P.A. 1982)

[11] *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F.3d 1368, 47 USPQ 2d 1596 (Fed. Cir. 1998)

matter under the sun that is made by a person is the proper subject matter of a patent. The three exclusions mentioned above recognize that subject matter that is not a practical application or use of an abstract idea, a law of nature or a natural phenomenon is not patentable. However, a machine, process, article of manufacture or composition of matter employing an abstract idea, law of nature or natural phenomenon may very well be patentable even though the underlying idea, law or phenomenon, by itself, is not patentable.[12] Practical application generally equates to usefulness. According to the Manual of Patent Examining Procedure (MPEP), this requirement of "usefulness" is made to limit patent protection to inventions that possess a certain level of concrete "real world" value, and not something that represents nothing more than an idea or concept or is merely a starting point for future investigation, as laudable as it may be. Therefore, it is highly critical to distinguish between abstract ideas and a practical application of such ideas. Hence a complete disclosure of an invention should contain some indication of the practical application for the claimed invention. In other words, the invention disclosure must contain some indication of why the inventor believes the invention is "useful." The inventor is in the best position to explain why his invention is deemed to be useful.

The claimed utility must derive from technological arts of applying science and engineering principles to the development of machines and processes that tend to improve the conditions of human existence. A small degree of utility, even a partial success at performing a function that benefits humanity, suffices to demonstrate patentable utility. However, an invention that is "inoperative" (i.e. does not produce the result claimed by the inventor and is totally incapable of achieving any useful result) has "incredible" utility and is not useful in the sense contemplated by 35 U. S. C. section 101. But such cases are indeed rare. A computer-related invention lies within the technological arts and meets the utility requirement and is statutory subject matter if it has a "practical application."[13]

(B) Computer Software:

i)      Software is based on mathematical algorithms that are defined as procedures for solving particular mathematical problems.

ii)      Mathematical formula, by itself, in the abstract, is not statutory subject matter.

iii)      Pure manipulation of numbers (ex. converting binary-coded decimal numerals into pure binary numerals for use with general-purpose computers) without any particular practical application is deemed an abstract idea.[14]

iv)      Obvious or insignificant post-solution activity such as storing or modifying a value that had been calculated using the

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[12] *In re Alappat*, 33 F.3d 1526, 31USPQ 1545 (Fed. Cir. 1994) (*en banc*)
[13] See footnote 11 above
[14] *Gottschalk v. Benson*, 409 U. S. 63 (1972)

software cannot turn a non-statutory subject matter into a statutory subject matter without practical application.

v)         Application of a known mathematical calculation as steps to a known process which is traditionally considered to be statutory subject matter does not render the process as a whole non-statutory.[15]

vi)         A general-purpose computer that is programmed to perform particular functions pursuant to instructions from program software becomes a special–purpose computer, in essence becoming a new machine. Such a programmed computer is statutory subject matter and claims directed to the software are statutory.[16] Hence, there is no need to show contrived circuit diagrams that represent the software. To make the claims statutory, it suffices to disclose how the software program flows in the general-purpose computer to perform the described functions.

vii)         Data structures *per se* are non-statutory.[17]

viii)         A memory containing a data structure is a statutory article of manufacture.[18]

ix)         A computer-readable medium containing the software for performing an invention is a statutory article of manufacture.[19]

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[15] *Diamond v. Diehr*, 450 U. S. 175, 209 USPQ 1 (1981). Four Justices dissented. The known formula in this case was an equation for calculating the cure time in the process for molding precision synthetic rubber products. The interior temperature of the molding press was constantly measured and these measurements were fed to a digital computer which constantly recalculated the cure time and indicated when the press should be opened to end the curing process.

[16] *In re Alappat*, 33 F.3d 1526, 31 USPQ 2d 1545 (Fed. Cir. 1994)(*en banc*). The invention relates to a means for creating a smooth waveform display in a digital oscilloscope. An input signal to the oscilloscope is sampled and digitized to provide a waveform data sequence where each successive element of the sequence represents the magnitude of the waveform at a successively later time. Following processing to provide a bit map, the waveform is ultimately displayed on a CRT screen which typically contains a finite number of pixels. The appearance of jaggedness in the rapidly rising and falling portions of a waveform is overcome by Alappat's anti-aliasing system wherein, using mathematical formulas, each vector making up the waveform is represented by modulating the illumination intensity of pixels having center points that bound the trajectory of the vector. The result is the presentation of a waveform showing no jaggedness but a smooth continuous form.

[17] *In re Warmerdam*, 33 F.3d 1354, 31 USPQ 2d 1754 (Fed. Cir. 1994)

[18] *In re Lowry*, 32 F.3d 1579, 32 USPQ 2d 1031 (Fed. Cir. 1994). The invention sought to optimize both structural and functional expressiveness of data models to provide an efficient, flexible method of organizing stored data in a computer memory. The disclosed data structure is based on the "Attributive data model" and is accessible by many different application programs. Claims are directed to a memory containing a stored data structure, a data processing system executing an application program, and to methods for creating a data structure and for creating and erasing non-hierarchical relationships between attribute data objects and referent attribute data objects within the data structure.

[19] *In re Beauregard*, 53 F.3d 1583, 35 USPQ 2d 1383 (Fed. Cir. 1995). The invention was related to a method of filling polygons being displayed on a graphical display system.

x)      Inventions that contain mathematical algorithms are patentable statutory subject matter when they apply the algorithm to produce a useful, concrete, tangible result <u>without</u> pre-empting all other uses of the algorithm.[20]  An affirmative statutory subject matter determination of process claims directed to the algorithm does not necessarily require a showing of physical transformation of the input data.  Such a transformation is merely an example of how a mathematical algorithm may be useful and may, therefore, assist in the determination of statutory or non-statutory subject matter.

(A)      So, is a computer software-related invention patentable or not?
Yes and no.  Software or data structure, *per se* (as a disembodied representation of a fundamental physical truth), will probably continue to be non-statutory subject matter.  However, if that software or data structure is used in a practical application, then it is likely to be patentable subject matter.  Of course, the application for patent must also meet the requirements of novelty, non-obviousness and full and enabling disclosure.

III.  Drafting Patent Application Based on Software-Related Invention
    (A)  Factors to Consider:
        i)      How to comply with the requirements of 35 U. S. C. section 112, first paragraph, mandating full and enabling disclosure and best mode description.
        ii)      Who are likely to use the invented technology to make, use, sell or import the product of the invention?  If a computer-related invention requires different actions to be taken by unrelated multiple parties before an infringement occurs, then there can never be a direct infringer.  If there is no direct infringement, then there cannot be a contributory infringement or active inducement to infringe.
        iii)      What steps are needed to perform the claimed process and where are potential infringing activities likely to occur?
        iv)      The ever-widening use of the Internet and the potentially world-wide dispersion of persons/entities committing direct, indirect, contributory infringements and active inducement of infringement.  In an infringement suit, it is best to have a direct infringer located in the United States for reasons of exercising personal jurisdiction and because without direct infringement, no contributory infringement or active inducement to infringe can exist.
    (B)  Types of Claims:

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[20] *AT &T Corp. v. Excel Communications Inc.*, Fed. Cir., No. 98-1338, April 14, 1999)

    i)              Apparatus/ product claim: defines a useful machine or manufacture by identifying the physical structure of the machine or manufacture in terms of its hardware or hardware and software combination.

        a)        A claim that encompasses any and all computer embodiment/ implementation of a process will be considered as directed to that underlying process and will be deemed to be statutory subject matter only if that underlying process itself is statutory subject matter.

        b)        A claim that defines a computer-related invention as a specific machine or specific article of manufacture describes the physical structure of the programmed computer or its hardware or software components. Such a claim, if it has a practical application in the technological arts, is undoubtedly statutory subject matter.

    i)           Process/ method claim: defines one or more steps to practice the process. A statutory computer-related process either results in a physical transformation outside the computer for which a practical application in the technological arts is either taught in the specification or would be known to one who is reasonably skilled in the technology in question; or the process is limited by the language in the claim itself to a practical application within the technological arts. A process that consists solely of mathematical operation or manipulation of abstract ideas without practical application is non-statutory whether it is performed on a computer or not.

    ii)        Some specific claim examples:

        a)        Computer-readable medium claims ("Beauregard" claims): directed to a computer-readable medium, such as computer memory, diskette or a CD-ROM, on which the software resides.

Example language:

An article of manufacture comprising:

a computer-usable medium having computer readable program code means embodied therein for---, the computer readable program code means in said article of manufacture comprising: computer readable program code means for causing a computer to effect---.[21]

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[21] U. S. Patent No. 5,710,578, Gary M. Beauregard et al. (1998)

A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for---, said method steps comprising:---[22]

b)      Data structure claims ("Lowry" claims): directed to a memory that stores, uses and manages information that resides in it. A data structure is a physical or logical implementation of a data model's organization of the data designed to support data manipulation functions. Therefore, if a claim cites a collection of data on the same medium without reciting any physical or logical relationship among the data, then the claimed data are non-statutory subject matter.

Example language:

A memory for storing data for access by an application program being executed on a data processing system, comprising:

A data structure stored in said memory, said data structure including information resident in a database used by said application program and including:---.[23]

c)      Means-plus-Function claims: The means-plus-function limitations must be read in light of the structure disclosed in the specifications. If the claimed invention encompasses any and every machine or article of manufacture for causing the computer to perform the underlying process, then the following questions must be answered:

1.      Does the claimed process have pre- and/or post-computer process activity that is more than nominal? A "Yes" answer advances the process toward affirmative determination of statutory subject matter.

2.      Does the claimed process manipulate abstract ideas or solve mathematical problems without limitation to a practical application? A "Yes" answer tolls the death knell of the claim.

IV.   Summary

Patent protection for software is widely available provided that the software in question is not merely an abstract idea constituting disembodied concepts or truths. An invention that contains a mathematical algorithm presents a statutory subject matter within the purview of 35 U. S. C. section

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[22] See footnote 21 above.
[23] *In re Lowry*, 32 F.3d 1579, 32 USPQ 2d 1031 (Fed. Cir. 1994)

101 if the mathematical algorithm has a practical application and if the invention, as a whole, produces a useful, concrete and tangible result or a result that corresponds to a useful, concrete and tangible thing (ex. electro-cardiograph representing a patient's heart activity).

A variety of intellectual property protection can be available for different aspects of one invention. Due to conflicting requirements of the trade secret and the patent laws, these two forms of protection are mutually exclusive and cannot protect the same aspect of an invention simultaneously. This mutual exclusivity stems from the fact that a trade secret must be kept secret in order to maintain its validity whereas to obtain a patent, there must be a full and complete disclosure of the invention.

Different aspects of a software invention may suitably be protected by trade secret, trademark, copyright or patent. The functional elements that are new, non-obvious and productive of useful, concrete and tangible results through practical applications may be protected by patent while original source and object codes are subject to copyright protection. Unique marks may qualify for trademark and trade secret may protect any valuable proprietary information regarding the software.


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